United States Patent

[11] 3,612,824

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[45] Patented Oct. 12, 1971

[54] **PORTABLE HEAT GUN**
3 Claims, 5 Drawing Figs.

[52] U.S. Cl. 219/370, 34/97, 219/367, 219/373, 219/374
[51] Int. Cl. H05b 1/00, F24h 3/04
[50] Field of Search 219/369, 370, 373, 380, 379, 364, 366, 367, 368, 359, 361; 34/96–100, 243

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Primary Examiner—A. Bartis
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ABSTRACT: The forward end of a tubular air discharge spout of a portable air blower is encompassed by a tubular collar supported in spaced relation thereto to form an annular channel for flow of ambient cooling air between the collar and spout. A heater tube having a flared aftersection is positioned in registry with the discharge spout to receive air from the channel and spout. The flared end is secured to the forward end of the collar and has a plurality of apertures through which a portion of the air discharges into an annular air passage formed by a tubular shield encompassing the heater tube in concentric spaced relation. The remainder of the air passes through the heater tube and is heated by an electric heater in the tube. The unheated air energizing from the forward end of the annular air passage encompasses the hot air outflow from the heater tube. The volume and temperature of the air discharge is regulated by an adjustable damper on the blower inlet. A switch enables the user to deenergize the heater, thereby affording a controllable airflow at ambient temperature.

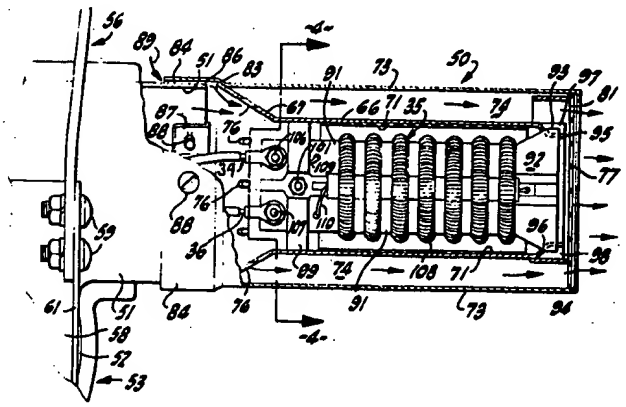

FIG. 1

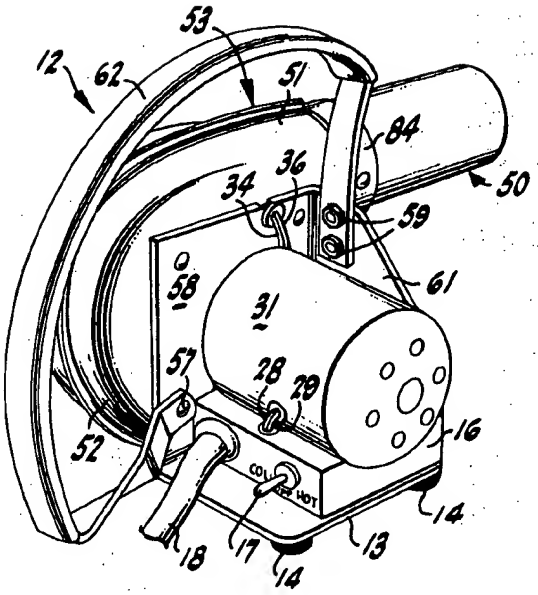

FIG. 2

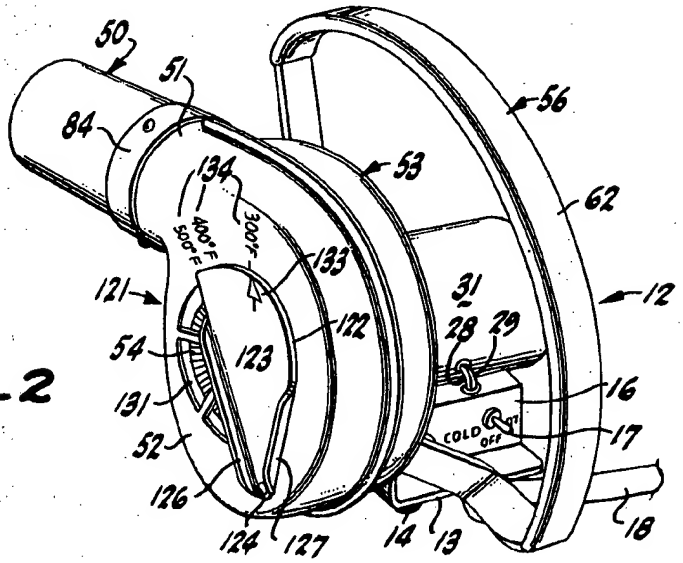

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FIG. 3

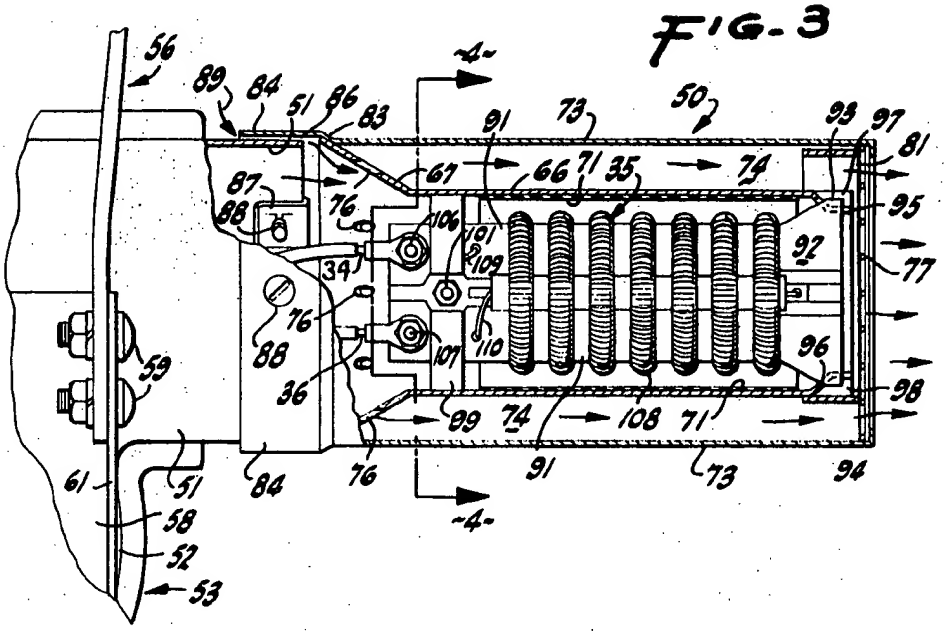
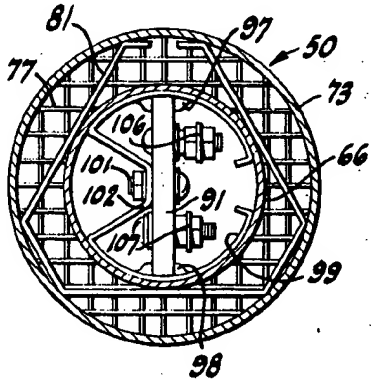


FIG. 4



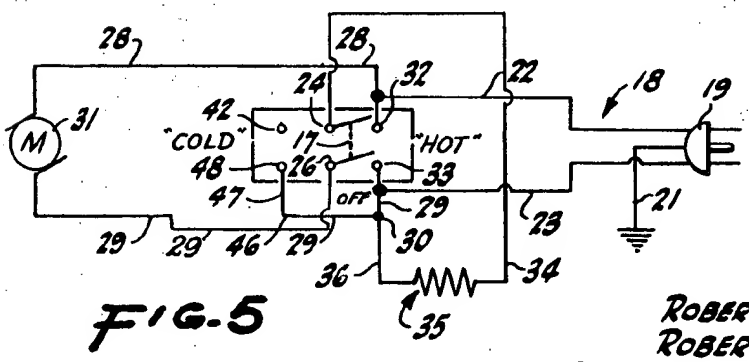


FIG. 5

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PORTABLE HEAT GUN

The invention relates to improvements in portable hot air blowers of the high thermal capacity type.

The market place as well as the patent literature is replete with portable hot air blowers capable of being oriented so as to afford a supply of warm air in a given direction. Exemplary of such devices are those utilized by hair stylists in the course of drying and shaping the customer's hair, it being important in this environment that the air temperature and velocity be maintained within reduced limits. At the other extreme are devices of the blowtorch variety, such as are used by plumbers and tile floor layers, wherein the temperature is high enough to melt solder, or to render pliable floor tiles of the rubber, vinyl and asphalt varieties. Intermediate the two foregoing types of mechanisms are blowers which can be moved from place to place, if required, and which can be utilized as space heaters or as atmospheric (temperature and humidity) modifiers.

So far as is known, however, none of the portable devices heretofore available have possessed the capability of providing a stream of air which can be nicely regulated as to temperature as well as selectively affording either a very high-capacity or a very low-capacity air flow.

It is therefore an object of the invention to provide a portable air blower in which the temperature of the discharging air can be controlled over a wide temperature range.

It is another object of the invention to provide a heated air blower which is light in weight, compact in size and is readily manipulated so as to afford close directional control, characteristics which suggest the title "heat gun" used herein.

It is yet another object of the invention to provide a portable heat gun which is safe in use in that no flame is used and heat shield members are provided to protect the user against the heat of the electrical heating coils.

It is a further object of the invention to provide a portable heat gun which is relatively economical, both as to initial cost and upkeep, yet which is rugged, versatile and reliable under a wide variety of uses and environments.

It is another object of the invention to provide a generally improved portable heat gun.

Other objects, together with the foregoing, are attained in the embodiment described in the following description and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of one side of the gun;

FIG. 2 is a perspective view of the other side of the gun;

FIG. 3 is a fragmentary view, to an enlarged scale, of the nozzle, heating element and heat shield, portions being shown in median sectional view;

FIG. 4 is a transverse sectional view of FIG. 3, the plane of the section being indicated by the line 4—4 in FIG. 3; and,

FIG. 5 is a wiring diagram.

While the portable heat gun of the invention is susceptible of numerous physical embodiments, depending upon the environment and requirements of use, substantial numbers of the herein shown and described embodiment have been made, tested and used, and all have performed in an eminently satisfactory manner.

The heat gun of the invention, generally designated by the reference numeral 12, comprises a frame 13, or base, supported on resilient supports 14. Mounted on the frame is a box 16 serving to house a 3-way toggle switch 17 movable from a central "OFF" position to either a left-hand "COLD" position or a right-hand "HOT" position, as appears most clearly in FIGS. 1 and 2.

Leading into the housing 16 is power cable 18 connected to a suitable electrical energy source (not shown) by the customary plug 19 (see FIG. 5).

The power cable 18 contains in addition to a "ground" wire 21 (see FIG. 5) a bus 22 and a return wire 23. More particularly, the bus 22 is connected to the switch terminal 32 and the return 23 is attached to the switch terminal 33.

When the switch lever 17 is in intermediate position all circuits are open.

When the switch 17 is moved to "HOT" position, two circuits are actuated. One circuit is the motor drive circuit comprising a pair of conductors 28 and 29 connected at one end to an electrical motor 31 mounted on the housing 16 and at the other end to respective switch terminals 32 and 26. The other circuit which is actuated when the switch 17 is moved to "HOT" position is a heater circuit including a pair of conductors 34 and 36 connected, respectively, to the switch terminals 24 and 33 and to a resistive-type heater 35.

As can be seen most clearly in FIG. 5, movement of double-pole switch 17 into "HOT" position closes the circuit extending from the plug 19 through conductor 22 to terminal 32. At terminal 32 the current divides, a first portion flowing through conductor 28 to the motor 31, and a second portion shunting through the terminal 24 and thence to the associated arm of the switch 17 to the conductor 34 to one side of the electrical heater 35.

The motor return wire 29 connects to the switch terminal 26 from which point it connects through the switch lever 17 to terminal 33 and return wire 23 to the plug 19.

In similar fashion, the heater return wire 36 connects to the switch terminal 33 and wire 23, and thereby completes the circuit.

In the event it is desired to blow unheated air, the switch 17 is moved to "COLD" position. As can be seen by reference to FIG. 5, the effect of this movement of the switch is to actuate only the motor circuit.

In other words, with the switch in "COLD" position, the current from conductor 18 and terminal 32 is led to motor circuit conductor 28. The motor return circuit is established by conductor 29, and junction 26, thence through switch 17 to terminal 48 and return conductor 47, junctions 46 and 30 and conductor 23 to plug 19.

As appears most clearly in FIG. 3, the air heater 35 is located within a nozzle member 50 mounted on the discharge spout 51 of a scroll casing 52, or housing, of a blower 53, comprising a rotor 54 suitably connected to and driven by the motor 31.

Support of the gun and accurate orientation of the nozzle 50 is afforded by a quadrant-shaped handle 56 (see FIGS. 1 and 2) suitably connected at one end by a fastener 57 to a vertical, fore and aft frame plate 58 and at the other end by fasteners 59 to a transverse gusset plate 61.

A handle cover 62 is selected of a material such that it will afford thermal, vibrational and electrical insulation.

With particular reference to FIGS. 3 and 4 it will be noted that the nozzle member 50 comprises a generally tubular structure termed a heater tube 66 having a divergingly flared after portion 67 arranged for registry with the forward end of the scroll spout 51 so as to receive the discharge from the blower and direct the airflow forwardly over the electrical heating coils 35 located in the central portion of the heater tube 66.

A sleeve 71 of mica is mounted on the inner walls of the heater tube 66 and provides insulation from the heating coils 35.

The heater tube 66 nevertheless becomes quite hot during extended use of the coils, and in order to prevent the user from being burned, a tubular shield member 73 is arranged concentrically with respect to the heater tube 66 and is spaced radially outwardly from the heater tube to define an annular chamber 74, or passageway, through which cooling air is driven.

A plurality of apertures 76 is provided in the flared after portion 67 of the heater tube 66; and through these apertures 76 flows a portion of the relatively cool air emerging from the spout 51 of the blower scroll 52. This cooling air then proceeds forwardly through the annular passageway 74, cooling the heater tube 66 and the shield 73 en route, and ultimately discharges from the forward end of the annular passageway 74, thereby joining and comingling with the main body of very hot air discharging from the forward end of the heater tube 66.

A wire screen mesh 77 covers the open end of the nozzle 50 in the interests of safety.

The forward end of the heater tube 66 is supported by a clip member 81 which is roughly triangular in elevation (see FIG. 4) but with the angles of the triangle being truncated. The clip 81 is conveniently formed from springy metal strap material and snugly confines the forward end of the heater tube. At the same time, the clip 81 is itself snugly confined by the tubular outer shield 73.

The flared afterend of the heater tube 66 is secured, as by welding, to the inside surface of an angular transition portion 83 at the afterend of the heat shield 73.

The transition portion 83 merges into an after collar portion 84 which encompasses the spout portion 51 of the blower.

In order to provide thermal insulation between the nozzle 50 and the spout 51, and annular spacing 86, or channel, is provided. The annular channel is defined by the inner surface of the tubular collar 84 and by the outer surface of the adjacent tubular spout 51. The spacing between the collar 84 and the spout 51 is established by a plurality of conventional J-nuts and attendant spring lock washers 87 and machine screws 88 located around the periphery of the spout 51.

As air discharges from the blower spout 51 at a relatively high velocity, air is "drawn in," by injection, from the outside, in the manner indicated by the arrow 89; and upon emerging from the annular channel 86 the air stream mingles with the high-velocity blower air.

The heating element 35 can be of any suitable configuration provided the desired electrical and thermal requirements are attained.

In the form of heater 35 shown most clearly in FIGS. 3 and 4, an elongated ceramic plate 91 is arranged in a fore-and-aft direction and in a vertical attitude. The forward end portion 92 of the ceramic plate 91 is flared and terminates in a forward upper tip 93 and a forward lower tip 94 lodged, respectively, in a fore-and-aft slot 95 and a fore-and-aft slot 96 formed in an upper dimple 97 and a lower depression, or dimple 98 (see FIGS. 3 and 4) formed in the forward end of the heater tube 66.

The after end of the ceramic plate 91 is held in place by a split ring 99 formed of spring metal strapping, a fastening 101 serving to secure the ceramic plate 91 to an indented portion 102 of the ring 99. Terminal lugs 106 and 107 connect the conductors 34 and 36, respectively to the heating coils 108 via appropriate connecting wires 109 and 110. The specific wiring of the heating element 35 forms no direct part of the invention herein, is considered within the purview of those skilled in the art and thus is neither shown nor described in detail.

In order to control the temperature of the hot air discharging from the nozzle during the "HOT" mode of operation, a temperature controlling mechanism 121 is afforded (see FIG. 2). This mechanism comprises a damper 122 including a segment plate 123 pivoted at its lower end on a pin 124. An outwardly bent forward lip 126 and afterlip 127 afford convenient finger holds when it is desired to pivot the damper plate 123, or gate, to the desired angular position.

The gate 123 slides on the underlying outer surface of the blower casing and serves selectively to cover and uncover, partially or completely, the air intake opening 131 formed in the blower casing. With the gate 123 swung out of the way, so that no portion of the opening 131 is covered, a large volume of ambient air is acted upon by the blower and the air discharging from the nozzle is consequently at a minimum heated temperature. With the opening 131 substantially entirely covered, on the other hand, a very small amount of relatively cool ambient air is blown over the heating coils, the result being that this relatively small volume of air is heated to a very high temperature.

Intermediate gate positions can be calibrated so that, as appears in FIG. 2, any desired nozzle discharge temperature, within limits, can be attained by swinging the gate 123 until the indicator arrow 133 is opposite the desired one of the temperature indicia 134.

After switching the toggle 17 from "OFF" to the desired mode of operation, either "COLD" or "HOT," the user can conveniently pick up the "gun" 12 and, by directing the nozzle 50 toward the work area, can immediately commence operations. The quadrant shape of the handle 56 readily enables the nozzle to be played up and down in a vertical arc while it can also be swung from side to side. A careful control of movement is thereby afforded.

In the event the "HOT" mode of operation is desired, such as for softening floor tile, the heat regulator 121 is adjusted to provide the appropriate temperature, e.g. 300° F. Where a higher temperature is required, in order to melt solder, for example, it is only necessary to swing the gate to the indicia corresponding to the temperature needed.

It can therefore be seen that we have provided a portable heat gun which is not only safely and conveniently maneuverable to afford a directional stream of hot or cool air, but which is also capable of nicely controlling the temperature of the air stream.

What is claimed is:

1. A portable heat gun comprising:
   a. a frame;
   b. an air blower mounted on said frame including a rotor and a casing having an air intake port and a tubular air discharge spout to direct air forwardly in a predetermined direction;
   c. a tubular collar mounted on and encompassing the forward end of said tubular spout in spaced relation to define a substantially annular channel for the flow of ambient air therethrough;
   d. a forwardly converging frustoconical member mounted on the forward end of said tubular collar and having a plurality of apertures extending through the converging walls of said member in said forward direction;
   e. a heater tube mounted on the forward end of said converging member, said tube extending forwardly to a hot air discharge end;
   f. electrical heating means mounted in said heater tube for heating the air entering said tube from said blower discharge spout and said annular channel less the air flowing through said apertures; and,
   g. a tubular shield encompassing said heater tube and forming therewith an annular passageway for the flow therethrough of air passing through said apertures and moving forwardly in said predetermined direction to emerge from the open forward end of said passageway in an annular flow pattern encompassing the hot air emitted from said air outflow from said heater tube, the air flow from said discharge spout being effective to induce the flow of ambient air through said annular channel and along the adjacent surface of said apertured frustoconical member, said ambient air flow helping to maintain the temperature of said tubular collar at ambient conditions.

2. A portable heat gun as in claim 1 wherein said tubular shield member is mounted on the after end of said frustoconical member adjacent the forward end of said tubular collar and in thermal contact therewith.

3. A portable heat gun as in claim 2 further including switch means for disconnecting said electrical heating means.

May 15, 1923. 1,455,034

J. W. SMALL

ELECTRICAL DRYING APPARATUS

Filed July 3, 1922

Fig 2.

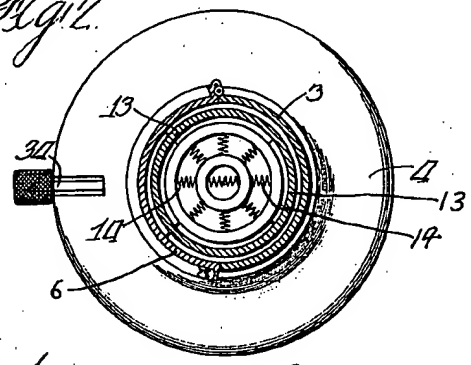
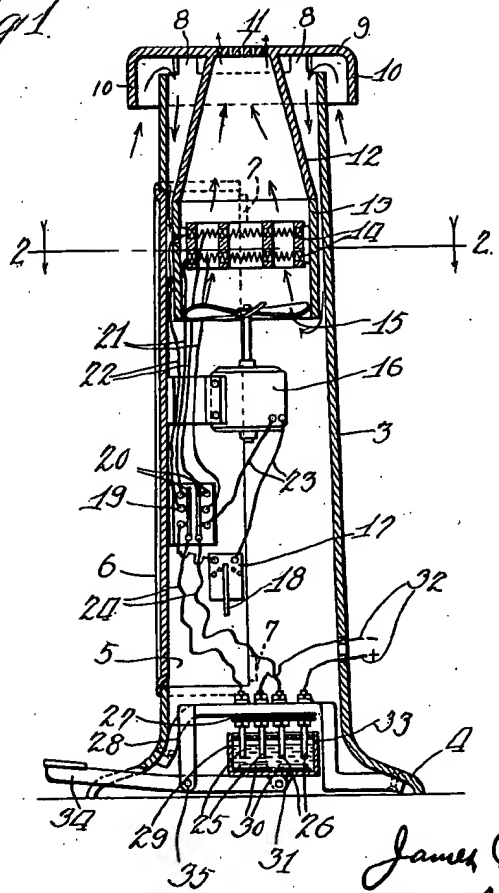


Fig 1.



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Attys

Patented May 15, 1923. 1,455,034

UNITED STATES PATENT OFFICE.

JAMES W. SMALL, OF CHICAGO, ILLINOIS.

ELECTRICAL DRYING APPARATUS.

Application filed July 3, 1922. Serial No. 572,690.

To all whom it may concern:

Be it known that I, JAMES W. SMALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Drying Apparatus, of which the following is a specification.

My invention relates to drying apparatus and particularly to electrical devices of this character adapted for drying the hands and face.

One object of my improvement is the provision of a simple and efficient device of the character mentioned.

A further object is the provision of a simple and efficient drying device in which cold air is passed along the heated air in order to preliminarily heat such air before reaching the heating element proper.

A further object is the provision of a simple device of this character having an enclosing casing with the operating parts of the device mounted on the door of the casing so as to swing entirely out of such casing when the door is opened.

A still further object is the provision of a passage for heated air having a heating element in one end thereof and means for guiding the cold air along the heated air passage so as to absorb heat therefrom before such air reaches the heating element proper.

Other objects will appear hereinafter.

An embodiment of my invention is illustrated in the accompanying drawing forming a part of this specification and in which—

Fig. 1 is a central section taken vertically through a device embodying my invention; and

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1.

Referring more particularly to the drawing, I provide a casing which may be of any preferred shape and size, but preferably tubular. Said casing 3 may have an enlarged portion 4 at its bottom to facilitate holding it in upright condition. In one side of the casing 3 is a door opening 5 in which is mounted a door 6 on hinges 7. The door 6 is preferably of a size so that the operating parts of the device can be mounted thereon and permit such operating devices to swing ut of the casing upon pening the door. This permits easy access to the operating parts of the device.

The casing 3 is open at its top and has extensions 8 extending upwardly therefrom with said extensions attached to a top 9. In the present instance, the top 9 is indicated as of substantially flat shape with a depending flange 10 extending down over the space between the casing 3 and the flat bottom 9. At the center of the part 9 is one or more openings 11 through which heated air is expelled from the casing 3. A partition 12, which in the present instance is indicated as being funnel-shaped, depends from the part 9 and surrounds the openings 11 so as to guide the air to said openings 11.

On the door 6 is mounted a tubular member 13 which has its top open and of substantially the same size and shape as the bottom of funnel 12. The adjacent edges of tube 13 and funnel 12 are so arranged that the door can easily open and move the tube 13 out of the casing without disturbing the funnel 12 and so that a substantially tight joint will be formed between the parts 12 and 13 when the door is closed.

Within the tube 13 is mounted a heating element 14. In the present instance, two of said heating elements are indicated, one above the other, and it will be understood that as many heating elements may be provided as desired. These heating elements are preferably electrical units and may be formed in any desirable manner, such as now in general use. The elements 14, however, are preferably arranged so as to engage as much air as possible while such air is passing through the tube 13.

Below the heating elements 14 in the tube 13 is a member for facilitating the movement of air through the tube 13. In the present instance, this is indicated as being a fan 15 mounted on an electric motor 16, and the latter is mounted on the door 6 so as to move out of the casing when the door is opened. The fan 15 is arranged somewhat near the lower end of the tube 13, and preferably just within the lower end of it, so as to ensure driving the air toward the heating element and drawing such air down around on the outside of tube 13 and through the openings between the extensions 8 at the top of casing 3.

The electric motor may be operated by any suitable electrical current supply and

contr lled in any desirable manner. I find that it is advantageous to arrange the electrical circuit of the motor so that the latter can be operated at a desired speed to heat the air issuing from openings 11 to desired temperatures. This may be accomplished by introducing resistance into the motor circuit, and in the present instance I have indicated a rheostat 17 mounted on the door 6 and connected in the motor circuit. The rheostat has a handle 18 which can be adjusted in the usual manner to vary the resistance placed in the motor circuit.

I also preferably provide a distributing block for connecting the heating and motor circuits so that should injury happen to any one of the circuits it will not interfere with the operation of the others. In the present instance, a block 19 of insulating material is mounted on the door 6 within the casing 3 and bus-bars 20 mounted on the block with a circuit 21 leading to one of the heating elements 14 and a circuit 22 leading to the other heating element. The motor circuit is indicated by the reference numeral 23. It will be seen that with this arrangement each of the heating elements and the motor circuit are so arranged that one can operate without the other.

The bus-bars 20 are connected by wires 24 to a cut-out switch at the bottom of the casing 3. This switch may be of any preferred construction. The construction shown has four contact members 25 and 26. These contact members are mounted in suitable insulating material 27 on a frame 28 in the casing. Below the contact members 25 and 26 is a vessel 29 containing an insulating material, such as oil, and in the bottom of the vessel 29 are electrical contact plates 30 mounted on insulation material 31. The arrangement is such that when the vessel 29 is moved upwardly the members 26 will engage one of the plates 30 and members 25 will engage the other plate 30 so as to connect the line wires 32 with the bus-bars 20. The members 25 and 26 may have a piece of insulation material 33 secured thereto in the vessel 29 so as to facilitate holding the oil in said vessel and guiding the latter during movements of said vessel to open and close the circuit. The vessel 29 is preferably mounted on the end of a lever 34 which may be pivoted as at 35 to the frame 28. With this arrangement, when it is desired to dry the hands and face, the person steps on lever 34 which closes the switch between wires 24 and 32, thus completing all of the electrical circuits in the device. The heating elements become hot and the fan motor drives the fan which sucks th air down around the funnel 12 and tube 13, and then forces it up through the heating elements out through funnel 12 and openings 11 to drive the hands or face held above said openings 11. When the hands are dry the operator simply takes his foot off f the lever 34 and the weight of the latter and vessel 29 automatically pens the switch, thereby breaking the electrical circuits and stopping the operation of the heaters and motor.

Important features of this invention are preliminarily heating the air before it reaches the heating elements proper and mounting the heating elements and fan on the door of the casing so that they can be moved to convenient position when desired upon opening the door.

I claim:—

1. Electrical drying apparatus comprising a casing having a plurality of openings in its top; an electrical heating element in the casing; and a partition in the casing separating said openings and adapted to direct air from certain of the openings to the heating element and from the latter to the other openings.

2. Electrical drying apparatus comprising a casing having a plurality of openings in its top, certain of said openings being disposed around the others; a partition extending downwardly from the top of the casing between said openings, and an electrical heating element within the partition.

3. Electrical drying apparatus comprising a casing having two sets of openings in its top, one set of said openings being disposed around the other set; a partition extending downwardly from the top of the casing between said sets of openings; an electrical heating element within the partition; and means for exhilarating the passage of air from one set of openings over the heating element to the other set of openings.

4. Electrical drying apparatus comprising a casing having a plurality of openings in its top, certain of the openings being disposed around the other openings; a tubular partition extending downwardly from the top of the casing and encircling the central openings; a heating element in the tubular partition; and a fan within the partition below the heating element.

5. Electrical drying apparatus comprising a tubular casing; a tubular partition disposed within and spaced from the inner walls of said casing, there being a discharge opening at the top of the casing opening into the interior of the partition and an intake opening at the top of the casing opening into the latter between the walls of such casing and said partition; and a heating element within the tubular partition.

6. Electrical drying apparatus comprising a casing having a door opening in one side; a door in said opening; and air heating means mounted on said door adapted to swing entirely out of the casing when the door is opened.

7. Electrical drying apparatus comprising a casing having a door opening in one side and intake and discharge openings at its top; a door in said door opening; a tubular partition extending downwardly from the top of the casing and separating said intake and discharge openings, part of said tubular partition being attached to the casing and another part of said partition being attached to the door; and a heating element mounted in the last-mentioned part of said tubular partition.

8. Electrical drying apparatus comprising a casing having a door opening in one side and intake and discharge openings at its top; a door in said door opening; a tubular partition extending downwardly from the top of the casing and separating said intake and discharge openings, part of said tubular partition being attached to the casing and another part of said partition being attached to the door; a heating element mounted in the last-mentioned part of said tubular partition; and a fan mounted on said door and disposed at the intake end of the passage in said tubular partition.

9. Electrical drying apparatus comprising a tubular casing having spaced intake and discharge openings at its top and a door opening in its side; a door in said door opening; a tubular partition extending downwardly from the top of the casing and separating said intake and discharge openings, a portion of said tubular partition being attached to the casing and another portion attached to the door, said portions of said tubular partition being adapted to move relatively from each other; and a heating element mounted in the part of said tubular partition attached to the door and movable with the latter.

10. Electrical drying apparatus comprising walls enclosing a central air passage; a heating element adapted to heat air in said air passage; and a wall surrounding the first-mentioned walls adapted to conduct cold air along the first-mentioned walls to said heating element.

11. Electrical drying apparatus comprising a casing with intake and discharge openings therein; a heating element in the casing; means in the casing for directing air from the intake opening to the discharge opening; a motor in the casing; a fan attached to the motor; and an electrical circuit including a variable resistance for regulating the speed of said motor.

12. Electrical drying apparatus comprising a casing; an electrical heating apparatus in the casing; an electrically driven fan in said casing; electrical circuits including said heating elements and motor of the motor driven fan; electrical supply wires connected with said electrical circuits; fixed contact members connected with said supply wires; movable contacts; an oil-holding vessel carrying said movable contacts; a lever mounted in the casing and attached to said vessel for moving the latter to carry said movable contacts into engagement with the fixed contacts.

13. Electrical drying apparatus comprising a casing having a door opening and a discharging opening therein; a door closing said door opening; and air-heating means mounted in the casing adjacent the door opening and connected with the air-discharging opening.

14. Electrical drying apparatus comprising a casing having air intake and discharging openings; heating means in the casing; means controlling the passage of air from said air intake opening to the heating means and from the latter to said air-discharging opening; and a door on the casing rendering the parts within the casing easily accessible.

In testimony whereof I have signed my name to this specification on this 17th day of June, A. D. 1922.

JAMES W. SMALL.

April 2, 1929. W. F. HENDRY 1,707,554

HAIR DRIER

Filed Feb. 13, 1928

Fig. 1.

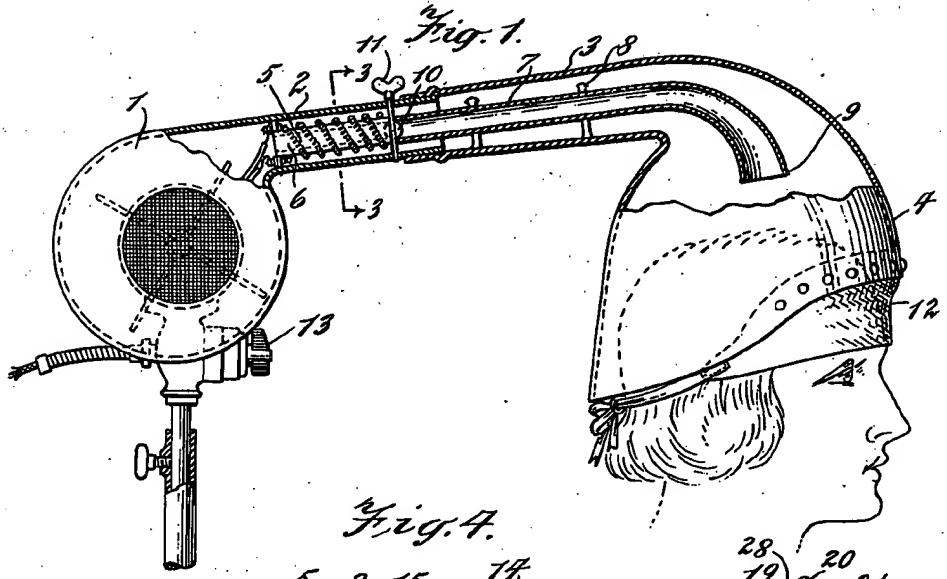


Fig. 4.

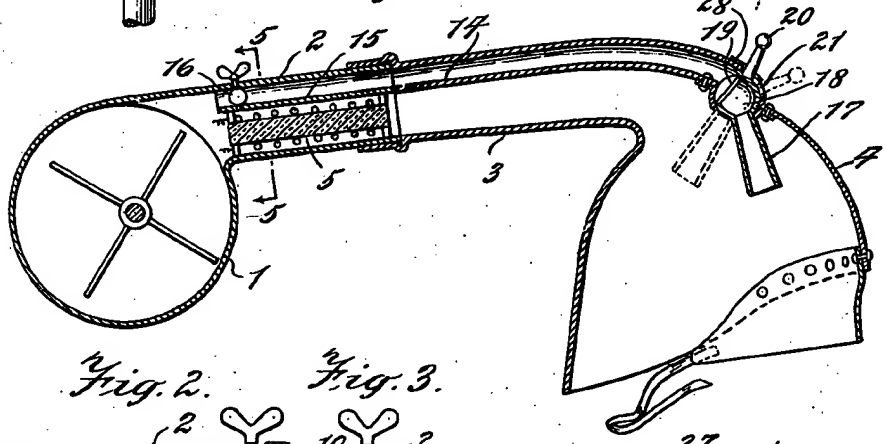


Fig. 2.

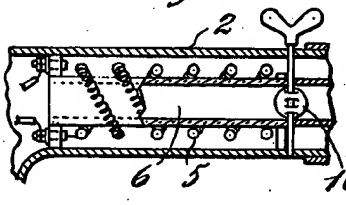


Fig. 3.

Fig. 5.

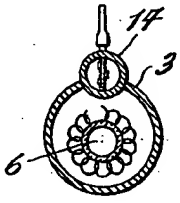
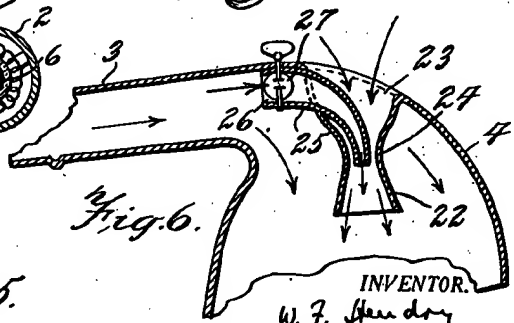


Fig. 6.



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Patented Apr. 2, 1929. 1,707,554

UNITED STATES PATENT OFFICE.

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HAIR DRIER.

Application filed February 13, 1928. Serial No. 253,966.

This invention relates to hair drying machines.

An object of the invention is the provision of a helmet for conducting hot air to the head of hair to be dried and incorporating in the helmet means for blowing a stream of cool air onto a portion of the head.

In the drying of hair on the head of a person currents of heated air have been used, these currents being directed at random on the hair. Hoods or helmets for fitting over the head and directing a current of heated air over the head are also known to the art. When hoods or helmets are used for directing hot air over the head and around the hair of a person, it many times happens that when the air is sufficiently hot to dry satisfactorily the hair hanging down at the sides of the head, which is relatively thick, the top of the head where the hair is thin, because of partings or because of a natural sparseness, may be made uncomfortably hot. The temperature of the heated air is therefore necessarily regulated so as to prevent discomfort at the top of the head. Such regulation naturally slows up the drying operation, as with reduced air temperature, the hair hanging at the sides of the head is dried less speedily.

It has been proposed to direct a jet of cool air against the top of the head where it is least protected by the hair so as to permit air of higher temperature than otherwise permissible to be blown through the hair hanging at the sides of the head, to carry out the drying process more quickly.

According to one feature of my invention I provide an improved means for forcing a jet of cool air onto the top of the head, and also provide means for directing said jet onto any desired portion of the head so that, if, due to different partings or unevenness of distribution of hair, one portion of the head becomes uncomfortably hot, the jet may be directed against such portion, and if another portion becomes too hot the jet may be directed against such other portion.

A more complete understanding of the invention may be had by reference to the following description and accompanying drawings.

In the drawings Fig. 1 illustrates in elevation and partly in section a hair drying device constructed in accordance with my invention.

Fig. 2 is a vertical longitudinal sectional view of the heater shown in Fig. 1.

Fig. 3 is a vertical transverse sectional view of the heater taken along lines 3—3 of Fig. 1.

Fig. 4 is a sectional view of a modified form of helmet having an adjustable cool air nozzle.

Fig. 5 is a sectional view taken along lines 5—5 of Fig. 4.

Fig. 6 is a view of another form of helmet having a cold air inspirator arrangement.

Referring more particularly to the drawings, reference numeral 1 indicates a blower having a discharge pipe 2 to which is attached, by a suitable joint, a pipe 3, terminating in a helmet or hood 4. Positioned within a blower discharge pipe 2 is a heating element 5 having an interior perforation 6 communicating with a pipe 7 positioned concentrically within the pipe 3 and supported therefrom by connections 8. This pipe 7 is bent downwardly to a position approximately central of the helmet 4 and terminates in a sort of nozzle 9. Placed in the pipe 7, for example, at the end nearest the heater 5, is a valve 10, which may be operated from the outside of the pipe 3 by a handle 11. Some suitable means such as a flexible band 12 may be provided for preventing air flowing into the hood 4 from being blown down over the face of the person being treated. The blower 1 and heating element 5 may be of the usual construction well known to the art and may be operated in a well known manner. For example, the blower may be driven by an electric motor controlled by a switch 13, which also controls the current passing through the heater 5.

In the modification shown in Fig. 4 the blower 1 and pipe 2 are substantially similar to that shown in Fig. 1. The pipe 3 attaches to the discharge pipe 2 in the same manner as shown in Fig. 1 and terminates in a similar hood 4. The heater 5 is positioned in the pipe 2 so as to heat all of the air passing through the pipe 3, and for conducting cool air to a given point inside the helmet an auxiliary pipe or conduit 14 is provided. This conduit 14 has an extension 15 inside of the pipe 2 which serves to conduct cool air from the fan, past the heater without the air being raised in temperature very much by the heater. The flow of cool air through the

pipe 15 is controlled by a valve 16 similar to the valve 10 shown in Fig. 1. The conduit terminates in a nozzle 17 fastened to the head 4 by means of a ball and socket joint 18. The ball of the ball and socket joint is made hollow and is provided with an opening 19 for the admission of air. The position of the nozzle 17 may be adjusted from the outside of the hood by means of a handle 20 connected to the ball and passing through an opening 21 in the conduit 13. For preventing air from escaping through the opening 21 a cover plate 28 may be provided. The blower 1 illustrated in connection with this modification may be similar to the blower shown in Fig. 1, of the ordinary type well known to the art. The relation of the conduit 14 to the pipe 3 is shown in Fig. 4.

In the modification shown in Fig. 6 an interior nozzle 22, interconnected with the hood 4, is provided. This nozzle is open to the atmosphere at 23 and is provided with a sort of Venturi throat 24 with which cooperates a pipe 25 having an opening 26 directed toward the current of air forced through the pipe 3 by the blower, not shown. The air rushing through the pipe 3 enters the opening 26 of the pipe 25 and is forced out through the nozzle 22 drawing with it a large quantity of cold air through the opening 23. The opening 26 is provided with a valve 27 for controlling the flow of air through the said pipe.

The operation of the device shown in Fig. 1 is as follows:

With the blower 1 running and the heater 5 energized hot air is being forced over the head of the person being treated, the temperature of the air being proportional to the amount of heat generated by the heater 5. In order to dry the hair quickly this temperature is kept relatively high, and in order to prevent discomfort due to the highly heated air striking the bare scalp at the parting of the hair, or where the hair is thin, as it necessarily is when the hair is combed down at the sides, the valve 10 is opened to the desired degree and air from the blower 1 forced through the perforation 6 in the heater 5 out of the nozzle 9 on to the top of the head. This air will be relatively cool as most of the heat from the heater 5 is absorbed outside of the perforation 6 and does not enter therein. By regulating the valve 10 the amount of cool air issuing from the nozzle 9 may be varied in order to produce the most agreeable feeling and to insure the best results.

The device shown in Fig. 4 operates in substantially the same manner as that shown in Fig. 1 except that the cool air direct from the blower is by-passed entirely around the heater 5. This air is directed on to any desired portion of the head merely by adjusting the position of the nozzle 17 by means f the handle 20. This arrangement is particularly advantageous where heads of hair of different types are treated as the greatest protection would be needed at the parting of the hair. This parting may be in different positions on the head and it is possible by means of the adjustable nozzle to keep that portion of the head cool.

The device shown in Fig. 6 operates as follows:

Hot air enters through the pipe 3 and is forced down through the helmet 4 in the direction indicated by the arrows. This hot air spreads around the head and circulates through the hair, drying the same. When it is desired to cool the top of the head the valve 27 is open, permitting a portion of the air stream to flow through the pipe 25. This air is expelled through the Venturi throat 24, causing cool air to be sucked through the opening 23 and forced out of the nozzle 22 on to the head. The amount of cool air ejected from the nozzle 22 can be regulated by opening or closing the valve 27.

As cool air, used for cooling the top of the head, strikes the head with considerable velocity very efficient cooling may be obtained and the temperature of the hot air passing through the pipe 3 correspondingly increased. It will be understood that the adjustable nozzle 17 can be applied to the device, as shown in either Fig. 1 or Fig. 6 equally well, in order to secure the advantages of a directable air stream.

The entire drying hood unit may be removed from the discharge pipe 2 merely by disconnecting the pipe 3 from the discharge pipe 2, and in place of the hood may be substituted the ordinary nozzle well known to the art. Where it is desired to remove the hood and replace it by an ordinary nozzle, the connection between the pipe 3 and the discharge pipe 2 should be of some standard type such as, for example, a bayonet joint or a friction joint.

The above detailed description and drawings of a particular form of my invention are intended merely for the purpose of illustration and it is to be understood that such various modifications and adaptations as would occur to one skilled in the art may be made without a departure from the spirit of the invention, as set forth in the appended claims.

What I claim is:

1. A hair drying machine comprising a blower, means for heating air from said blower and directing it over a large portion of the head, and means for directing a concentrated stream of cold air on any desired portion of the head.

2. A hair drying machine comprising an air blower, two conduits leading from said blower, one of said conduits leading to a hel-

met for fitting over the head and the other of said pipes leading to an adjustable nozzle positioned within the said helmet.

3. A hair drying machine comprising a helmet for fitting over the head, means for blowing hot air into said helmet around said head, means within the helmet for directing a concentrated blast of cold air on a portion of said head, and means outside said helmet for pointing said means within the helmet at any desired portion of the head.

4. A hair drying device comprising two conduits, one within the other, one of said conduits terminating in a helmet for fitting over the head and the other of said conduits terminating in a nozzle within the said helmet, an adjustable mounting for said nozzle, and means outside the helmet for varying the direction of said nozzle.

5. A hair drying machine according to claim 4 wherein the nozzle is provided with a ball and socket connection so that it can be pointed in any desired direction.

6. In a hair drying device, a helmet, means for conducting hot air to said helmet, means for by-passing a concentrated blast of relatively cool air to said helmet, and means for varying the localization of said blast on the head.

7. In a hair drying machine, a heating tube, means for blowing a stream of air past said tube to heat the said air, means for blowing another stream of air past said tube without substantially heating said other stream, means for conducting the heated stream over a person's head, and means for directing the unheated stream onto a particular spot on the head.

8. In a hair drying device, a hood for fitting over the head, means for blowing air into said hood, a pipe adjustably fastened through the wall of said hood so that it may be pointed in any desired direction, a tube connecting said pipe with the atmosphere for forming a variable by-pass for a concentrated blast of cool air.

9. The method of drying hair which comprises projecting a blast of heated air upon the major portion of the head, simultaneously projecting a localized blast of cool air upon the head, and varying the localization of said cool blast.

10. A hair drying machine having a blower, a pair of pipes for directing air from said blower on a head, means for heating the air passing through one of said pipes, a helmet for fitting over the head and connected to one of said pipes, the other of said pipes being provided with a nozzle within the helmet for directing air on to a localized portion of the head, said nozzle being adjustable so as to direct the localized air onto any portion of the head.

In testimony whereof, I have signed my name to this specification, this 11 day of February, 1928.

WILLIAM F. HENDRY.